HD3SS460EVM-SRC

The HD3SS460 is a high-speed passive crosspoint switch designed to support low- and high-speed signal switching required for Type C, with Alternate mode applications. This guide describes how to bring up the EVM and includes schematics that can be used as reference design for the Alternate mode implementations of the host systems with the HD3SS460 device.

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1 HD3SS460EVM-SRC

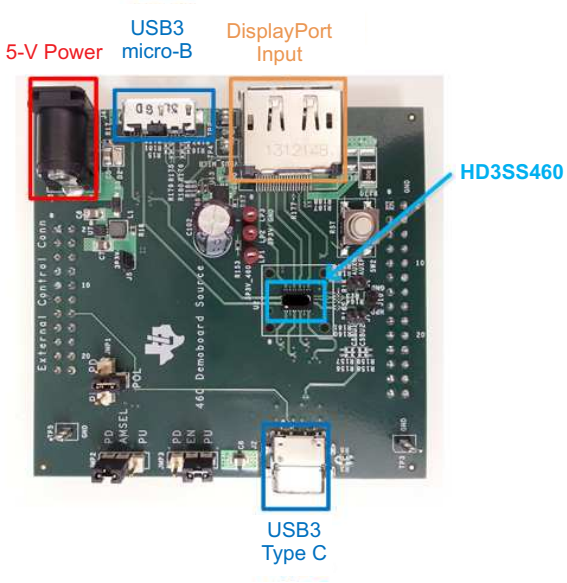

Figure 1. HD3SS460EVM-SRC

The HD3SS460EVM-SRC can be used with a legacy DP Source and/or USB Host system to evaluate the Type C implementation. Figure 2 is a typical test set-up.

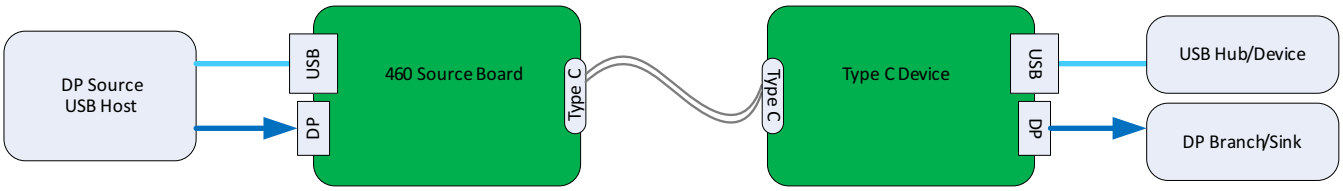

Figure 2. Test Board Setup

The EVM comes with a legacy USB receptacle to connect to legacy USB systems and a DisplayPort receptacle to connect to DisplayPort capable source. There is no on-board CC/PD controller. The board has test headers that can be used to connect CC and other necessary signals to an external Type-C controller to evaluate the Type-C implementation.

The EVM schematics shown in this document are based upon the pin assignment defined in the Alternate mode over Type C specification as shown in Figure 3.

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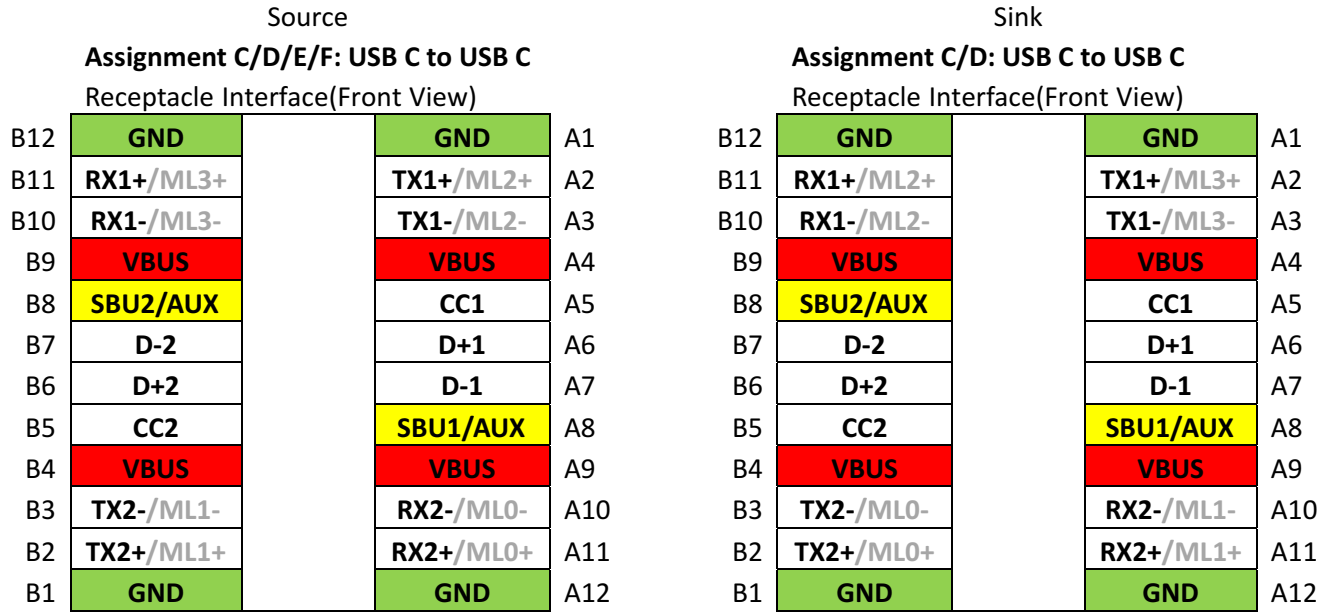

Figure 3. Alternate Mode Over Type C Specification

The following tables represent the example pin mapping to the HD3SS460 for the DP Source pin assignments C ,D, E and F, and DP Sink pin assignments C and D.

SOURCE Pin Assignment Option C/E			
		POL = H AMSEL = H EN = H	POL = L AMSEL = H EN = H
Receptacle Pin Number	460 Pin mapping to Type C Connector	460 Pin mapping to DP Source(GPU)	460 Pin mapping to DP Source(GPU)
A11/10	CRX2	LnD(ML3)	LnA(ML0)
A2/3	CTX1	LnB(ML1)	LnC(ML2)
B11/10	CRX1	LnA(ML0)	LnD(ML3)
B2/3	CTX2	LnC(ML2)	LnB(ML1)
A8	CSBU1	SBU2(AUXN)	SBU1(AUXP)
B8	CSBU2	SBU1(AUXP)	SBU2(AUXN)

SINK Pin Assignment Option C			
		POL = H AMSEL = H EN = H	POL = L AMSEL = H EN = H
Receptacle Pin Number	460 Pin mapping to Type C Connector	460 Pin mapping to DP Sink	460 Pin mapping to DP Sink
A11/10	CRX2	LnD(ML2)	LnA(ML1)
A2/3	CTX1	LnB(ML0)	LnC(ML3)
B11/10	CRX1	LnA(ML1)	LnD(ML2)
B2/3	CTX2	LnC(ML3)	LnB(ML0)
A8	CSBU1	SBU2(AUXP)	SBU1(AUXN)
B8	CSBU2	SBU1(AUXN)	SBU2(AUXP)

SOURCE Pin Assignment Option D/F			
		POL = H AMSEL = L EN = H	POL = L AMSEL = L EN = H
Receptacle Pin Number	460 Pin mapping to Type C Connector	460 Pin mapping to DP Source(GPU)	460 Pin mapping to DP Source(GPU)
A11/10	CRX2	SSRX	LnA(ML0)
A2/3	CTX1	LnB(ML1)	SSTX
B11/10	CRX1	LnA(ML0)	SSRX
B2/3	CTX2	SSTX	LnB(ML1)
A8	CSBU1	SBU2(AUXN)	SBU1(AUXP)
B8	CSBU2	SBU1(AUXP)	SBU2(AUXN)

SINK Pin Assignment Option D			
		POL = H AMSEL = L EN = H	POL = L AMSEL = L EN = H
Receptacle Pin Number	460 Pin mapping to Type C Connector	460 Pin mapping to DP Sink	460 Pin mapping to DP Sink
A11/10	CRX2	SSRX	LnA(ML1)
A2/3	CTX1	LnB(ML0)	SSTX
B11/10	CRX1	LnA(ML1)	SSRX
B2/3	CTX2	SSTX	LnB(ML0)
A8	CSBU1	SBU2(AUXP)	SBU1(AUXN)
B8	CSBU2	SBU1(AUXN)	SBU2(AUXP)

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2 HD3SS460EVM-SRC Configuration

This section provides the configuration options available in the HD3SS460EVM-SRC.

2.1 Jumper Configuration

Following JMPs are provided for mux/board configuration purposes.

Reference Designator	JMP Control	Config
JMP1	POL	SHUNT on pin 2–4
JMP2	AMSEL	See table below
JMP3	EN	SHUNT on pin 2–3
J5	3.3V	SHUNT on pin 1–2

JMP2 is provided to configure the HD3SS460 for 4-lanes of DisplayPort or 2-lanes of DisplayPort + SS TX/RX. Make sure JMP2 is configured to match the configuration of the connected Type-C device. The JMP2 configuration must match between two nodes for correct operation.

	ML 2-lane + USB SS (Pin Assignment C)	ML 4-lane + USB HS only (Pin Assignment D)
JMP2	SHUNT on pin 1–2	SHUNT on pin 2–3

2.2 Power

The EVM is designed to operate off of the VBUS from a USB host connected via USB micro connector J2. No external power to be via J6 unless standalone operation is desired.

2.3 External PD/CC Controller Connection

Headers J11 and J12 are provided in case there is a need for external PD/CC controller connection. Refer to the EVM schematics for the pinout of the headers.

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3 HD3SS460 AC Coupling Cap Placement Recommendation

The EVM does not have AC capacitors as the EVM is intended to be used with systems that have capacitors placed per the corresponding interface specification.

This section describes guidelines for placing the components, including AC coupling caps in a system implementation with the HD3SS460.

Figure 4 and Figure 5 depict the AC coupling cap placement examples. TI recommends placing the capacitors as shown in the illustrations for the backward compatibility and interoperability purposes as some of the existing USB systems may present Vcm, exceeding the typical range of 0–2 V on SS differential pairs.

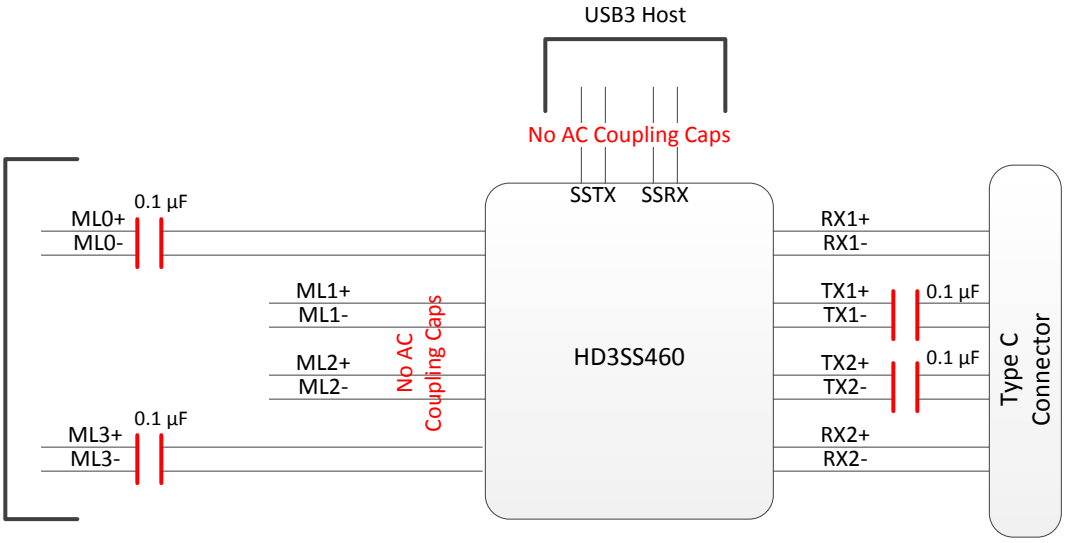

Figure 4. HD3SS460 USB Host/DP Source Implementation Example With SSTX/RX Vcm < 2 V

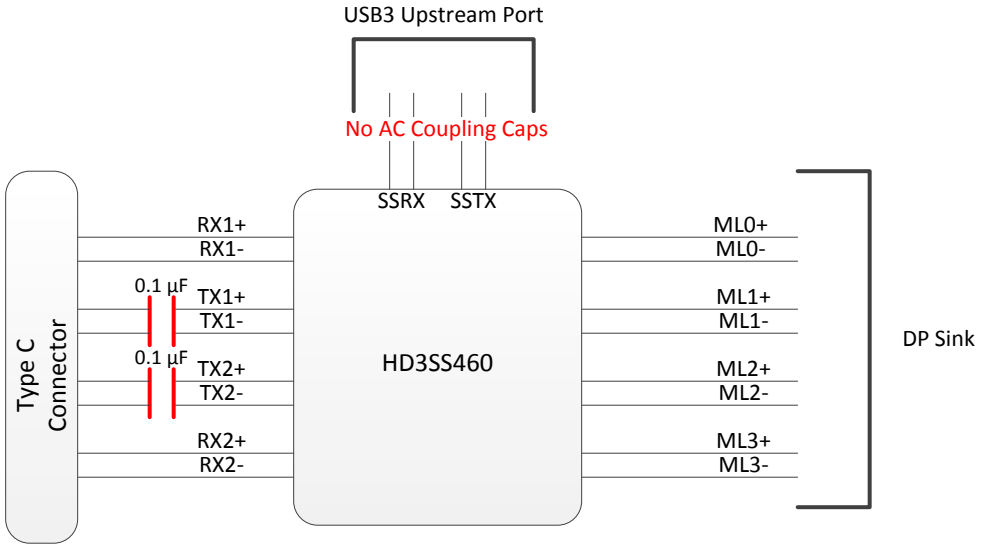

Figure 5. HD3SS460 USB Upstream/DP Sink Implementation Example With SSTX/RX Vcm < 2 V

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Figure 6 and Figure 7 depict the AC coupling cap recommendations in case the upstream or downstream port connected internally to the HD3SS460 presents Vcm greater than 2 V.

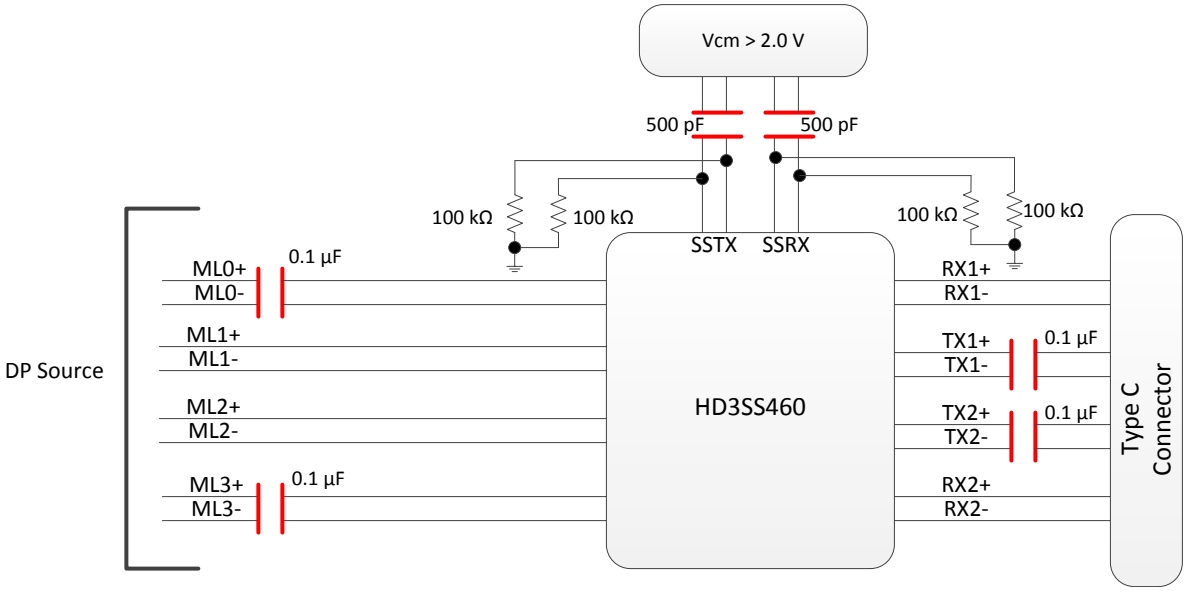

Figure 6. HD3SS460 USB Host/DP Source with SS USB Vcm

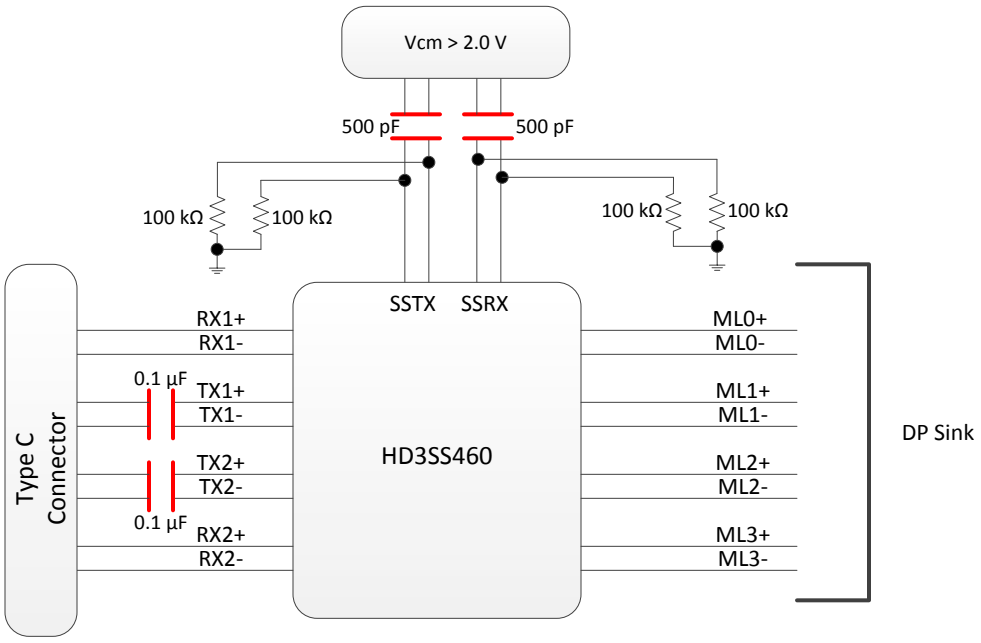

Figure 7. HD3SS460 USB Upstream/DP Sink Implementation Example

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4 HD3SS460EVM-SRC Schematics

Figure 8 through Figure 10 illustrate the HD3SS460EVM-SRC schematics.

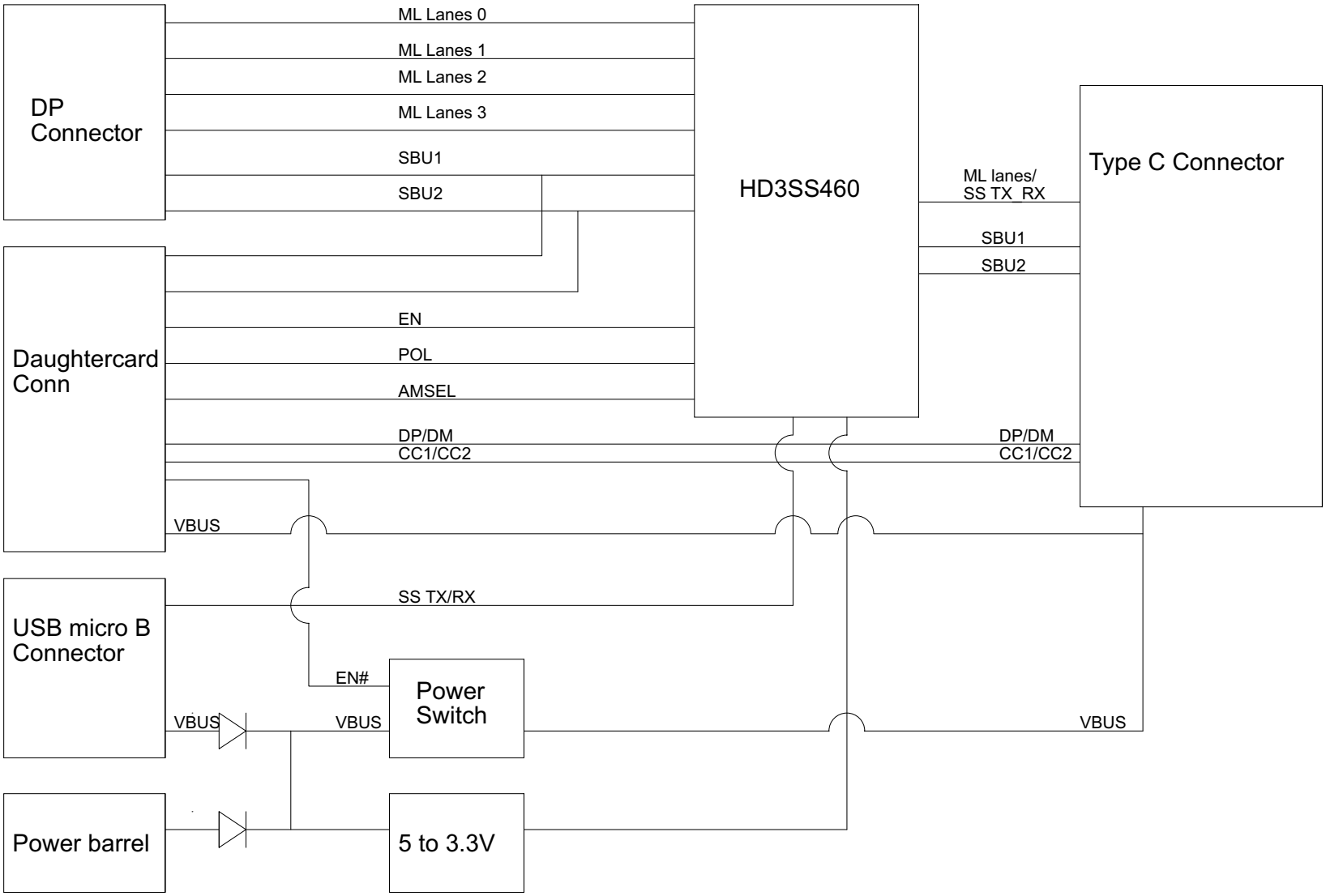

Figure 8. Schematic (Page 1 of 3)

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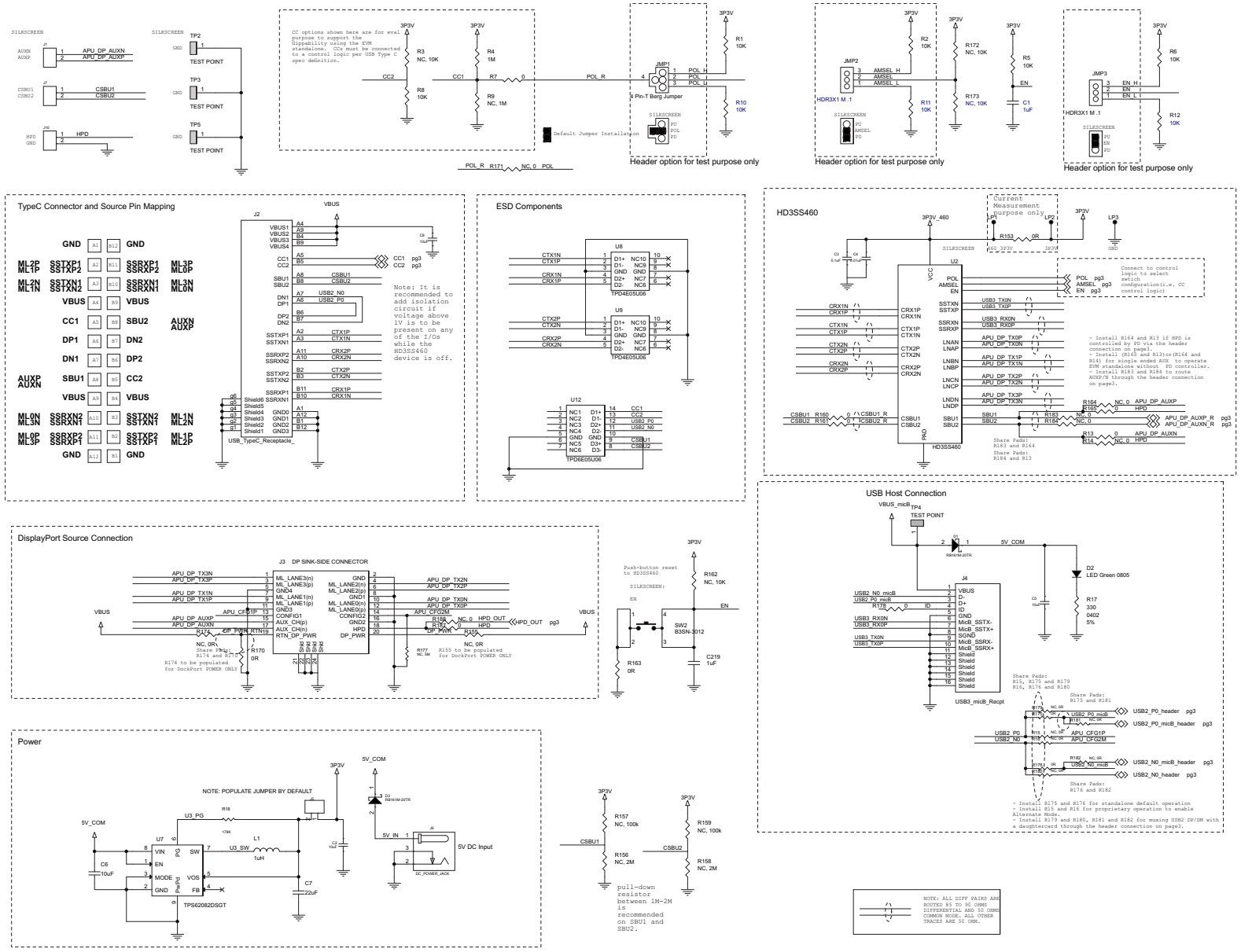
TypeC Connector and Source Pin Mapping
ESD Components
HD3SS460
DisplayPort Source Connection
USB Host Connection
Power
Header option for test purpose only
Header option for test purpose only
Header option for test purpose only
Note: It is recommended to add isolation circuit if voltage above 1V is to be present on any of the I/Os while the HD3SS460 device is off.
Connect to control logic to select switch configuration(i.e. CC control logic)
- Install R164 and R13 if HPD is controlled by PD via the header connection on page3.
- Install (R165 and R13)or(R164 and R14) for single ended AUX to operate EVM standalone without PD controller.
- Install R183 and R184 to route AUX2/N through the header connection on page3.
Share Pads: R183 and R164
Share Pads: R184 and R13
J3 DP SINK-SIDE CONNECTOR
Push-button reset to HD3SS460
SILKSCREEN:
R162 NC, 10K
SW2 B3SN-3012
R163 0R
C219 1uF
Share Pads: R15, R175 and R179 R16, R176 and R180
Share Pads: R175 and R181
Share Pads: R176 and R182
- Install R175 and R176 for standalone default operation
- Install R15 and R16 for proprietary operation to enable Alternate Mode.
- Install R179 and R180, R181 and R182 for muxing USB2 DP/DM with a daughtercard through the header connection on page3.
NOTE: POPULATE JUMPER BY DEFAULT
TPS62082DSGT
5V DC Input
pull-down resistor between 1M~2M is recommended on SBU1 and SBU2.
NOTE: ALL DIFF PAIRS ARE ROUTED 85 TO 90 OHMS DIFFERENTIAL AND 50 OHMS COMMON MODE. ALL OTHER TRACES ARE 50 OHM.

Figure 9. Schematic (Page 2 of 3)

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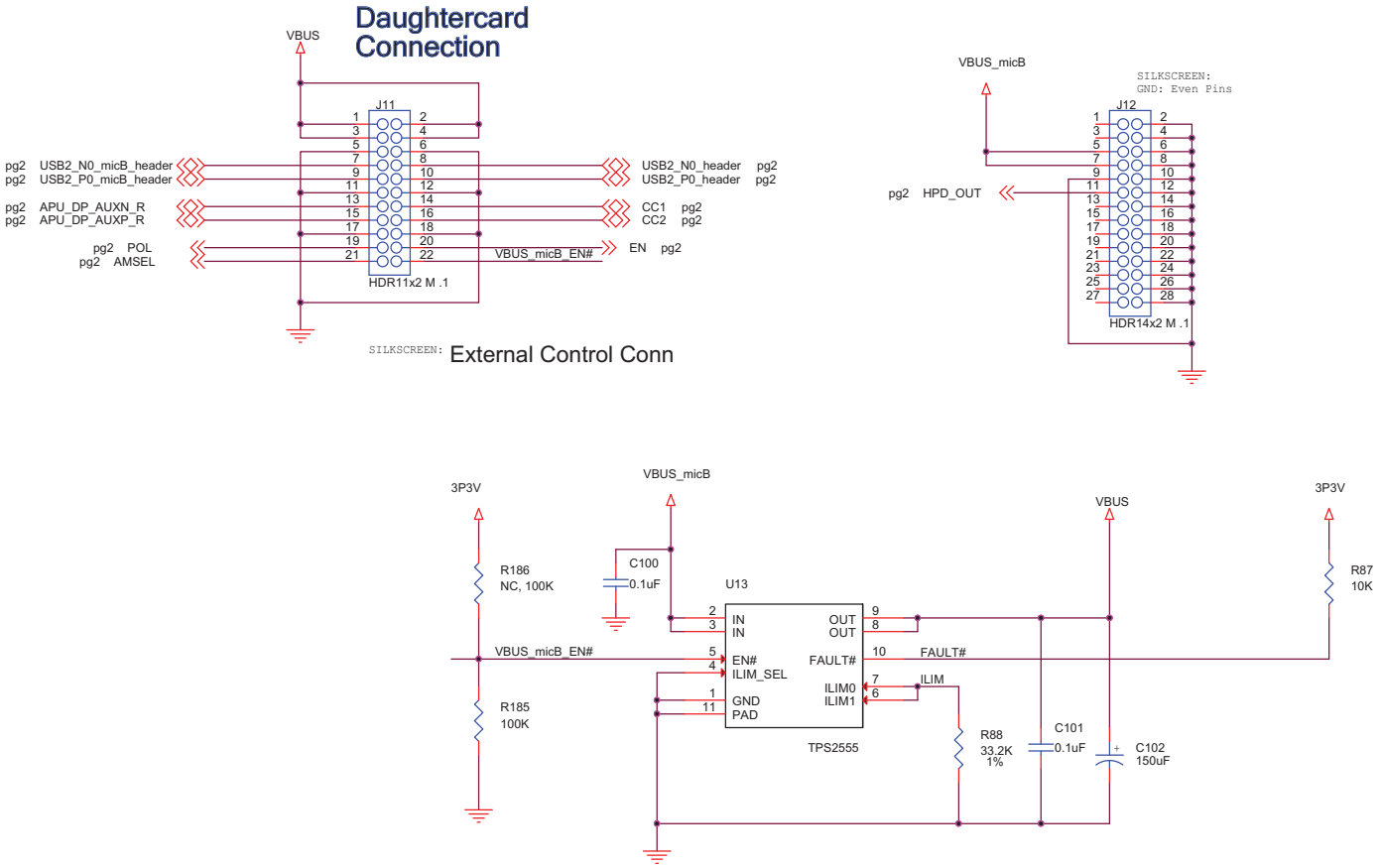

Figure 10. Schematic (Page 3 of 3)

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5 Bill of Materials

Table 1 lists the HD3SS460EVM-SRC bill of materials (BOM).

Table 1. HD3SS460 Bill of Materials

Part #		Qty.	Value	Designators	PKG/ Case	T.COEFF/ PWR	Volt Rated	Description	Dist P/N	MFG	MFG Part #
KS	Customer										
18461	A 1	1	0.1µF	C3	0201	X5R	10V	Capacitors	587-2241-2-ND	Taiyo Yuden	LMK063BJ104KP-F
11320	A 1	1	10000pF	C4	0201	X7R	10V	Capacitors	490-3194-2-ND	Murata Electronics North America	GRM033R71A103KA01D
19293	B 5 / Corner 1	2	0.1µF	C100, C101	0402	X5R	25V	Capacitors	GRM188R71E474KA12D	TDK Corporation	C1005X5R1E104K
12900	B 6/INTEL- 4	1	1.0µF	C1	0402	X5R	10V	Capacitors	587-1454-2-ND	Taiyo Yuden	LMK105BJ105KV-F
11068	C 1	1	1.0µF	C219	0603	X7R	16V	Capacitors	445-1604-2-ND	TDK Corporation	C1608X7R1C105K
11013	D 6	2	10µF	C2, C6	0805	X5R	16V	Capacitors	478-5165-2-ND	Taiyo Yuden	EMK212BJ106KG-T
11013	D 6	2	10µF	C5, C8	0805	X5R	16V	Capacitors	478-5165-2-ND	Taiyo Yuden	EMK212BJ106KG-T
12360	D 7	1	22µF	C7	0805	X5R	6.3V	Capacitors	445-1422-2-ND	TDK Corporation	C2012X5R0J226M/1.25
29503	K 4	1	150µF	C102	P2.5 D6.3 H16	-55°C ~ 105°C	16V	Capacitors	493-5014-1-ND	Nichicon	UPJ1C151MED1TD
11539	L 1	6	0.0 (0 Ω)	R13, R160, R161, R165, R178, R187	0201	1/20W	50V	Resistors	P0.0AGTR-ND	Vishay Dale	CRCW02010000Z0ED
11074	M 20/Corner 1/ INTEL- 5	5	0.0 (0 Ω)	R7, R153, R163, R175, R176	0402	1/16W		Resistors	311-0.0JRTR-ND	Yageo	RC0402JR-070RL
11074	M 20/Corner 1/ INTEL- 5	1	0.0 (0 Ω)	R163	0402	1/16W		Resistors	311-0.0JRTR-ND	Yageo	RC0402JR-070RL
11481	M 4	1	1.00M	R4	0402	1/16W		Resistors	541-1.00MLTR-ND	Vishay Dale	CRCW04021M00FKED
14220	M 14 / INTEL - 6	9	10.0K	R1, R2, R5, R6, R8, R10–R12, R87	0402	1/10W		Resistors	P10.0KLTR-ND	Panasonic Electronic Components	ERJ-2RKF1002
11016	M 1 / INTEL 13	1	100K	R186	0402	1/16W	1/10W	Resistors	311-100KLRTR-ND	Yageo	RC0402FR-07100KL
26416	M 31	1	178K	R18	0402	1/10W		Resistors	P178KLTR-ND	Panasonic Electronic Components	ERJ-2RKF1783X
11322	M 4	1	33.2K	R88	0402	1/16W	50V	Resistors	P33.2KLTR-ND	Panasonic Electronic Components	ERJ-2RKF3322X
21035	M 24	1	330	R17	0402	±100ppm/°C	1/10W	Resistors	P330LTR-ND	Panasonic Electronic Components	ERJ-2RKF3300X
34546	Q 1	1	0.0	R170	1210	2W	1/2W	Resistors	RMCF1210ZT0R00CT-ND	Stackpole	RMCF1210ZT0R00
31419	U 260/U 233	1	TPD6E05U06RVZR	U12	14-UFDFN		14V	Circuit Protection	TPD6E05U06RVZR	TI	TPD6E05U06RVZR
23970	Y 51	1	1µH	L1	SMDV 3.0X3.0X1.5mm	2.1A		Inductors_Coils_ Chokes	587-1647-1-ND	Taiyo Yuden	NR3015T1R0N
11522	Z 1	1	LED - Green Diffused	D2	0805	20mA	2V	Optoelectronics	67-1553-2-ND	Lumex Opto Components Inc	SML-LXT0805GW-TR
28591	AE 42	2	Single - Schottky	D1, D3	SOD-123F	1A	20V	Discrete Semiconductor Products	RB161M-20CT-ND	Rohm Semiconductor Usa, Llc	RB161M-20TR
28387	U 174	1	TPS2555DRC	U13	10-SON		14V	Integrated Circuits	TPS2555DRCT	TI	TPS2555DRC
34379	U 286	1	HD3SS460	U2	28-QFN			Integrated Circuits	HD3SS460-	TI	HD3SS460-
26427	U 228	1	TPS62082DSGT	U7	8-WSON			Integrated Circuits	TPS62082DSGT	TI	TPS62082DSGT
33617	U 279	2	TPD4E05U06DQAR	U8, U9	SON-10			Integrated Circuits	TPD4E05U06DQAR	TI	TPD4E05U06DQA

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Table 1. HD3SS460 Bill of Materials (continued)

Part #		Qty.	Value	Designators	PKG/ Case	T.COEFF/ PWR	Volt Rated	Description	Dist P/N	MFG	MFG Part #
KS	Customer										
20654	AF 18	1	PB SPST-NO Off-Mom	SW2	6.50mm x 6.00mm			Switches	SW261CT-ND	Omron Electronics Inc-Emc Div	B3SN-3012P
12926	AH 4	3	Test Loop - Red	LP1, LP2, LP3	0.040		14V	Test Equipment	5000	Keystone Electronics	5000
11087-4	AM 2/Corner 3	1	1 × 4	JMP1	0.1"	High Temp		Connectors	HTSW-150-07-G-S	Samtec Inc	HTSW-150-07-G-S
11087-3	AM 2/Corner 3	2	1 × 3	JMP2, JMP3	0.1"	High Temp		Connectors	HTSW-150-07-G-S	Samtec Inc	HTSW-150-07-G-S
11087-1	AM 2/Corner 3	4	1 × 1	TP2, TP3, TP4, TP5	0.1"	High Temp		Connectors	HTSW-150-07-G-S	Samtec Inc	HTSW-150-07-G-S
11087-2	AM 2/Corner 3	1	1 × 2	J5	0.1"	High Temp		Connectors	HTSW-150-07-G-S	Samtec Inc	HTSW-150-07-G-S
19280-11	AM 68	1	2 × 11	J11	0.1x0.1"	High_Temp		Connectors	HTSW-150-14-G-D	Samtec Inc	HTSW-150-14-G-D
19280-14	AM 68	1	2 × 14	J12	0.1x0.1"	High_Temp		Connectors	HTSW-150-14-G-D	Samtec Inc	HTSW-150-14-G-D
19004	AM 126	6	50 pin	J1, J7, J10	1.27MM	High Temp		Connectors	S9014E-50-ND	Sullins Connector Solutions	GRPB501VWVN-RC
24057	AM 105	1	R/A	J6	2.1mm ID, 5.5mm OD	-25°C ~ 85°C	5A	Connectors	CP-202AH-ND	Cui	PJ-202AH
12502	AM 20 / BB 1	1	Display Port	J3	20 Pin			Connectors	47272-0001	Molex-Waldom Electronics Corporation	47272-0001
34373		1	USB-TYPE C	J2	SMT			Connectors	UT12123-1A501-7H	Foxconn	UT12123-1A501-7H
31416	AM 31	1	USB - microUSB 3 Type B	J4	SMT T/H version			Connectors	798-ZX360D-B-10P	Hirose	ZX360D-B-10P
14560	HW/Corner 2	3	Shunt	Note	0.1" SP	High Temp		Hardware	151-8000-E	Kobiconn	151-8000-e
DNI	-	25	DNI	R3, R162, R172, R173, R9, R14, R164, R171, R188, R179, R180, R182, R182, R155, R174, R15, R16, R155, R174, R156, R157, R158, R159, R185, R177	DNI	DNI	DNI	Undefined Category		DNI	DNI

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Revision History

Changes from Original (February 2015) to A Revision	Page
• Changed *HD3SS460 EVM* to *HD3SS460EVM-SRC* globally in document.	1
• Added *HD3SS460 AC Coupling Cap Placement Recommendation* section.	5

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

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STANDARD TERMS AND CONDITIONS FOR EVALUATION MODULES

1. *Delivery:* TI delivers TI evaluation boards, kits, or modules, including any accompanying demonstration software, components, or documentation (collectively, an “EVM” or “EVMs”) to the User (“User”) in accordance with the terms and conditions set forth herein. Acceptance of the EVM is expressly subject to the following terms and conditions.

   1.1 EVMs are intended solely for product or software developers for use in a research and development setting to facilitate feasibility evaluation, experimentation, or scientific analysis of TI semiconductors products. EVMs have no direct function and are not finished products. EVMs shall not be directly or indirectly assembled as a part or subassembly in any finished product. For clarification, any software or software tools provided with the EVM (“Software”) shall not be subject to the terms and conditions set forth herein but rather shall be subject to the applicable terms and conditions that accompany such Software

   1.2 EVMs are not intended for consumer or household use. EVMs may not be sold, sublicensed, leased, rented, loaned, assigned, or otherwise distributed for commercial purposes by Users, in whole or in part, or used in any finished product or production system.

2 *Limited Warranty and Related Remedies/Disclaimers*:

   2.1 These terms and conditions do not apply to Software. The warranty, if any, for Software is covered in the applicable Software License Agreement.

   2.2 TI warrants that the TI EVM will conform to TI's published specifications for ninety (90) days after the date TI delivers such EVM to User. Notwithstanding the foregoing, TI shall not be liable for any defects that are caused by neglect, misuse or mistreatment by an entity other than TI, including improper installation or testing, or for any EVMs that have been altered or modified in any way by an entity other than TI. Moreover, TI shall not be liable for any defects that result from User's design, specifications or instructions for such EVMs. Testing and other quality control techniques are used to the extent TI deems necessary or as mandated by government requirements. TI does not test all parameters of each EVM.

   2.3 If any EVM fails to conform to the warranty set forth above, TI's sole liability shall be at its option to repair or replace such EVM, or credit User's account for such EVM. TI's liability under this warranty shall be limited to EVMs that are returned during the warranty period to the address designated by TI and that are determined by TI not to conform to such warranty. If TI elects to repair or replace such EVM, TI shall have a reasonable time to repair such EVM or provide replacements. Repaired EVMs shall be warranted for the remainder of the original warranty period. Replaced EVMs shall be warranted for a new full ninety (90) day warranty period.

3 *Regulatory Notices:*

   3.1 *United States*

      3.1.1 *Notice applicable to EVMs not FCC-Approved:*

      This kit is designed to allow product developers to evaluate electronic components, circuitry, or software associated with the kit to determine whether to incorporate such items in a finished product and software developers to write software applications for use with the end product. This kit is not a finished product and when assembled may not be resold or otherwise marketed unless all required FCC equipment authorizations are first obtained. Operation is subject to the condition that this product not cause harmful interference to licensed radio stations and that this product accept harmful interference. Unless the assembled kit is designed to operate under part 15, part 18 or part 95 of this chapter, the operator of the kit must operate under the authority of an FCC license holder or must secure an experimental authorization under part 5 of this chapter.

      3.1.2 *For EVMs annotated as FCC – FEDERAL COMMUNICATIONS COMMISSION Part 15 Compliant:*

      CAUTION

      This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

      Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

      FCC Interference Statement for Class A EVM devices

      NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Interference Statement for Class B EVM devices

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- *Reorient or relocate the receiving antenna.*
- *Increase the separation between the equipment and receiver.*
- *Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.*
- *Consult the dealer or an experienced radio/TV technician for help.*

3.2 *Canada*

3.2.1 *For EVMs issued with an Industry Canada Certificate of Conformance to RSS-210*

Concerning EVMs Including Radio Transmitters:

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Concernant les EVMs avec appareils radio:

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Concerning EVMs Including Detachable Antennas:

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication. This radio transmitter has been approved by Industry Canada to operate with the antenna types listed in the user guide with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Concernant les EVMs avec antennes détachables

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante. Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés dans le manuel d'usage et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur

3.3 *Japan*

3.3.1 *Notice for EVMs delivered in Japan:* Please see http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_01.page 日本国内に輸入される評価用キット、ボードについては、次のところをご覧ください。
http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_01.page

3.3.2 *Notice for Users of EVMs Considered "Radio Frequency Products" in Japan:* EVMs entering Japan may not be certified by TI as conforming to Technical Regulations of Radio Law of Japan.

If User uses EVMs in Japan, not certified to Technical Regulations of Radio Law of Japan, User is required by Radio Law of Japan to follow the instructions below with respect to EVMs:

1. Use EVMs in a shielded room or any other test facility as defined in the notification #173 issued by Ministry of Internal Affairs and Communications on March 28, 2006, based on Sub-section 1.1 of Article 6 of the Ministry's Rule for Enforcement of Radio Law of Japan,
2. Use EVMs only after User obtains the license of Test Radio Station as provided in Radio Law of Japan with respect to EVMs, or
3. Use of EVMs only after User obtains the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to EVMs. Also, do not transfer EVMs, unless User gives the same notice above to the transferee. Please note that if User does not follow the instructions above, User will be subject to penalties of Radio Law of Japan.

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3.3.3 *Notice for EVMs for Power Line Communication:* Please see http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_02.page

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4 *EVM Use Restrictions and Warnings:*

4.1 EVMS ARE NOT FOR USE IN FUNCTIONAL SAFETY AND/OR SAFETY CRITICAL EVALUATIONS, INCLUDING BUT NOT LIMITED TO EVALUATIONS OF LIFE SUPPORT APPLICATIONS.

4.2 User must read and apply the user guide and other available documentation provided by TI regarding the EVM prior to handling or using the EVM, including without limitation any warning or restriction notices. The notices contain important safety information related to, for example, temperatures and voltages.

4.3 *Safety-Related Warnings and Restrictions:*

4.3.1 User shall operate the EVM within TI's recommended specifications and environmental considerations stated in the user guide, other available documentation provided by TI, and any other applicable requirements and employ reasonable and customary safeguards. Exceeding the specified performance ratings and specifications (including but not limited to input and output voltage, current, power, and environmental ranges) for the EVM may cause personal injury or death, or property damage. If there are questions concerning performance ratings and specifications, User should contact a TI field representative prior to connecting interface electronics including input power and intended loads. Any loads applied outside of the specified output range may also result in unintended and/or inaccurate operation and/or possible permanent damage to the EVM and/or interface electronics. Please consult the EVM user guide prior to connecting any load to the EVM output. If there is uncertainty as to the load specification, please contact a TI field representative. During normal operation, even with the inputs and outputs kept within the specified allowable ranges, some circuit components may have elevated case temperatures. These components include but are not limited to linear regulators, switching transistors, pass transistors, current sense resistors, and heat sinks, which can be identified using the information in the associated documentation. When working with the EVM, please be aware that the EVM may become very warm.

4.3.2 EVMs are intended solely for use by technically qualified, professional electronics experts who are familiar with the dangers and application risks associated with handling electrical mechanical components, systems, and subsystems. User assumes all responsibility and liability for proper and safe handling and use of the EVM by User or its employees, affiliates, contractors or designees. User assumes all responsibility and liability to ensure that any interfaces (electronic and/or mechanical) between the EVM and any human body are designed with suitable isolation and means to safely limit accessible leakage currents to minimize the risk of electrical shock hazard. User assumes all responsibility and liability for any improper or unsafe handling or use of the EVM by User or its employees, affiliates, contractors or designees.

4.4 User assumes all responsibility and liability to determine whether the EVM is subject to any applicable international, federal, state, or local laws and regulations related to User's handling and use of the EVM and, if applicable, User assumes all responsibility and liability for compliance in all respects with such laws and regulations. User assumes all responsibility and liability for proper disposal and recycling of the EVM consistent with all applicable international, federal, state, and local requirements.

5. *Accuracy of Information:* To the extent TI provides information on the availability and function of EVMs, TI attempts to be as accurate as possible. However, TI does not warrant the accuracy of EVM descriptions, EVM availability or other information on its websites as accurate, complete, reliable, current, or error-free.

6. *Disclaimers:*

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